# Progress Report & Roadmap CP1

***Multicolored Multiplexers***

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## Progress Report

### Functionalities Implemented/Work Completed

For the first checkpoint, the goals were first to familiarize ourselves with the concepts behind an ooo processor, design our own ooo datapath, determine which advanced features to implement, write the parameterizable queue and instruction fetch, and write this report/roadmap. All these tasks were completed successfully.

### Division of Labor

Our group had an initial meeting to get to know each other and identify group logistics and plans. We then decided to go through the lectures and online resources on our own and come up with ideas for the datapath and then reconvene for a brainstorming session. We met, having all caught up on the material and reviewed each other's design ideas and suggestions, and formed an initial datapath. We also coordinated a mentoring meeting with Aditya Nebhrajani to check on our thinking.

Tyler - Drew up datapath with planned features to implement and implemented circular queue module
Soumil - Implemented Fetch & Decode
Jay - was sick

### Testing Strategies

Hooked up fetch and decode to the circular queue and manually verified in Verdi using a test program (alu.sv). Checked that the queue was emitting full and empty signals correctly. Additionally, it was verified that the queue wrapped around after it was filled, then emptied, then filled again. Fetch and Decode were checked to ensure they were properly fetching instructions and that it would properly stall when the instruction queue filled up.

### Current Datapath

https://drive.google.com/file/d/1KogmaMYfLVObvLSIMb3sGG44uEM9Bqb_/view?usp=sharing

## Roadmap (For first report, will be full project roadmap)

### Planned Progress in Functionalities

We have 6 weeks for this MP and so here is our current idea of when we will complete what:

Week of 3/18:

1. Catch up on out-of-order concepts and design considerations
2. Design initial datapath
3. Identify advanced features to accommodate in datapath
4. Meet with course staff for feedback on datapath
5. Meet CP1 Requirements

Week of 3/25:

1. Declare war on Bosnia
2. Code out full datapath (25 Hrs)
    a. Fetch, Decode, Rename, Dispatch, Issue/Wakeup, Execute, Writeback/Resolution, Commit/Retire
    b. EC: Early Branch Recovery
    c. EC: Superscalar
    d. Integrate provided multiplier
3. Hook up RVFI
4. Perform tests with RVFI on custom test cases
5. Debug (30+ Hrs)
6. Meet CP2 Requirements

Week of 4/1:

1. Debug and pass core mark with magic memory (40+ Hrs)
    a. Meet CP3 Requirements
2. EC: Code Speculative Loads (15+ Hrs)

Week of 4/8: 411 MT2 Also. Buffer week in the case.

1. EC: Ensure Early Branch Recovery, Superscalar, Data Predictor Fully Work (30+ Hrs)
2. EC: Draft code for 2 branch predictors (20+ Hrs)

Week of 4/15:

1. EC: Verify Branch Predictor (6+ Hrs)
2. EC: Finish Cocotb Visualization (10+ Hrs)
3. EC: Code Prefetcher (20+ Hrs)

Week of 4/22:

1. EC: Verify Prefetcher (40+ Hrs)
2. Write Report
3. Prepare for Presentation

**Planned Division of Labor for Next Week**

(CP2):

- Integrate the provided multiplier into your processor as a functional unit - (Jay/Soumil/Tyler)
- Out-of-order execution of the arithmetic operation:
    - Decoder/Dispatch into Reservation Stations - Jay
    - Reservation Stations - Soumil
    - The ROB - Tyler
    - RAT/RRAT - Tyler
    - Functional Units - Soumil
    - Common Data Bus - Jay
    - Register File/Free List - Tyler